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ABSTRACT

This study explored the relationship between an increase in the percentage of certified teachers and gains in performance on reading and mathematics achievement tests among New York City Schools Under Registration Review (SURR) elementary and middle schools. It examined whether the percentage of certified teachers related to student outcomes systemwide. Multiple regression analysis was used to examine the amount of variance in student achievement explained by teacher certification rate over and above the amount of variance explained by student demographic characteristics. Student demographics included percentage of students receiving free lunch, identified as English language learners, and receiving special education services. Teacher certification rate was defined as the percentage of certified teachers in the school during the 1999-00 school year. Data analysis indicated that teacher certification related to student outcomes. At the school level, higher percentages of certified teachers positively related to the percentage of students showing high achievement in reading and mathematics and inversely related to the percentage showing low achievement. Student demographics significantly explained variation among schools for achievement in reading and mathematics, though teacher certification rates contributed additional explanatory power that was also statistically significant. (SM)

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FLASH RESEARCH REPORT #2

October 10, 2000

Division of Assessment & Accountability
New York City Board of Education

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Division of Assessment
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October 10, 2000

FLASH RESEARCH REPORT #2

Impact of Teacher Certification on Reading and Mathematics Performance in Elementary and Middle Schools in New York City

KEY FINDINGS

The percentage of certified teachers in New York City elementary and middle schools is significantly and meaningfully related to academic achievement in reading and mathematics, even after controlling for student demographics. Specifically:

- A 10 percentage point increase in a school's percentage of certified teachers was associated with an increase of as much as 3.7 percentage points in students achieving standards on state and city reading tests and as much as 4.8 percentage points in mathematics. There was a corresponding decrease in students scoring at level 1.

- After controlling for student demographics, certification rates explained 4.4 percent of variation in students' reading scores and 5.4 percent of variation in mathematics scores. This explanatory power was statistically significant and somewhat greater for elementary than middle schools, and for mathematics than reading.

BACKGROUND

Flash Report #1[a] identified a positive correlation between an increase in the percentage of certified teachers and gains in performance on reading and mathematics achievement tests in Schools Under Registration Review (SURR). However, the study focused on a limited number (N = 88) of low-performing schools in the context of the extended-time initiative, and the schools were demographically similar. Flash Research Report #2 directly explores this relationship further using data for all elementary and middle schools in New York City. It addresses the question of whether there is additional evidence that the percentage of certified teachers in a school is related to student outcomes systemwide. Specifically, does teacher certification rate explain differences in achievement among schools beyond that explained by the demographics of the students themselves?

METHODOLOGY

The relationship between student demographics and achievement has been amply demonstrated in educational research. Less attention has been given to the extent to which teacher background and experience are related to student achievement.

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[a]Flash Research Report #1 examined the impact of the extended-time initiative on student performance and recruitment of certified teachers in Schools Under Registration Review (SURR). The relationship between teacher certification and students' academic performance in these SURR schools was examined as well.

The present study uses multiple regression analysis to study these relationships by examining the amount of variance in student achievement that is explained by teacher certification rate over and above the amount of variance explained by student demographic characteristics.

The student demographics considered in these analyses are the percentages of students receiving free lunch, identified as English language learners, and receiving special education services. Teacher certification rate is defined as the percentage of certified teachers in the school during the 1999-2000 school year.

Separate multiple regression analyses were conducted for elementary and middle schools on reading test scores in grades 3-7, and mathematics test scores in grades 3, 5, 6, and 7. The percentage of students who met grade performance standards (levels 3 and 4) and the percentage of students furthest from those standards (level 1) were regressed separately on the explanatory variables.

FINDINGS

Flash Research Report #2 provides additional evidence that the percentage of certified teachers at the school level is related to student outcomes even after controlling for the effects of student demographics. Table 1 reports the results of the multiple regression analyses for achievement at levels 3 and 4 on reading and mathematics tests. As expected, student demographics (i.e., free lunch, ELL, and special education) explained 67.2 percent of score variation in reading in elementary schools and 68.3 percent in middle schools. In mathematics, student characteristics explained 62.4 percent of score variation in elementary schools and 64.5 percent in middle schools. Thus, approximately two-thirds of the variance in the percentage of students meeting academic standards was explained by student demographics.

Beyond student demographics, teacher certification rates had statistically significant explanatory power. After taking student characteristics into account, certification rates explained as much as an additional 5.4 percent of variation in student performance. For elementary schools, an additional 4.4 percent of variation was explained in reading, and 5.4 percent in mathematics. For middle schools, an additional 1.6 percent of variation was explained in reading, and an additional 2.0 percent in mathematics.[b]

Table 2 reports comparable findings for level 1 performance. For reading, student characteristics explained 54.9 percent of score variation for elementary school students and 62.5 percent for middle school students. In mathematics, 55.7 percent of score variation in elementary schools and 64.4 percent in middle schools were explained by these student characteristics.

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[b]The lower explanatory power of teacher certification in middle schools is probably due to restriction in the range of the variables.

Again, teacher certification rates had additional and statistically significant explanatory power after accounting for student characteristics. For elementary schools, an additional 7.5 percent of variation was explained in reading and an additional 9.0 percent in mathematics. For middle schools, an additional 1.7% of variation was explained in reading and 1.7% in mathematics.

Using the B coefficients obtained in the regression analyses, Table 3 explores the impact of changes in the percentage of certified teachers on students' tests scores in reading and mathematics. For reading test scores, a 10 point increase in the percentage of certified teachers resulted in as much as a 3.7 point increase in the percentage of students achieving at levels 3 and 4 and as much as a 3.0 point decrease in students achieving at level 1.

For mathematics, a 10-point increase in the percentage of certified teachers was associated with as much as a 4.8 point increase in students at levels 3 and 4 and a 4.6 percentage point decrease in students at level 1.

CONCLUSIONS

Flash Research Report #2 provides additional evidence that teacher certification is related to student outcomes; the correlations are both statistically significant and educationally meaningful. At the school level, higher percentages of certified teachers are positively related to the percentage of students showing high achievement in reading and mathematics, and inversely related to the percentage showing low achievement.

Student characteristics--free lunch, English language learner status, and special education enrollment—are very powerful in explaining variation among schools for achievement at levels 3 and 4 in both reading and mathematics and almost as powerful for explaining performance at level 1. Nevertheless, teacher certification rates contribute additional explanatory power that is also statistically significant. Explanatory power is somewhat greater for elementary than middle schools, and for mathematics than reading.

A more extensive study of the role of teacher characteristics in determining student achievement is now underway. That study will provide a more detailed exploration of teacher factors on student outcome measures. The analyses will focus at the classroom rather than school level.

Table 1

Explanatory Power of Selected Student Characteristics and Teacher Certification Rate on the Percentage of Students Achieving Levels 3 and 4 in Reading and Mathematics

Test	Level	% Variation Explained by Student Characteristics	% Additional Variation Explained by Certification Rate	% Total Variation Explained (R^2)	Combined Correlation (Multiple R)
Reading	Elementary	67.2	4.4*	71.6	.85
Reading	Middle	68.3	1.6*	69.9	.84
Mathematics	Elementary	62.4	5.4*	67.9	.82
Mathematics	Middle	64.5	2.0*	66.5	.82

*$p < .01$.

Table 2

Explanatory Power of Selected Student Characteristics and Teacher Certification Rate on the Percentage of Students Achieving Level 1 in Reading and Mathematics

Test	Level	% Variation Explained by Student Characteristics	% Additional Variation Explained by Certification Rate	% Total Variation Explained (R^2)	Combined Correlation (Multiple R)
Reading	Elementary	54.9	7.5*	62.4	.79
Reading	Middle	62.5	1.7*	64.2	.80
Mathematics	Elementary	55.7	9.0*	64.7	.80
Mathematics	Middle	64.4	1.7*	66.1	.81

*$p < .01$.

Table 3

Percentage Point Change in Standardized Test Scores for Percentage Point Increases in Certified Teachers*

School Level	Test Score	Increase in Certified Teachers	
		1 Point	10 Points
Reading Test			
Elementary	% Levels 3 & 4	.374	3.74
Elementary	% Level 1	-.295	-2.95
Middle	% Levels 3 & 4	.203	2.03
Middle	% Level 1	-.108	-1.08
Mathematics Test			
Elementary	% Levels 3 & 4	.482	4.82
Elementary	% Level 1	-.458	-4.58
Middle	% Levels 3 & 4	.224	2.24
Middle	% Level 1	-.191	-1.91

*Based on B coefficients from multiple regression analyses controlling for student demographics.